

Asbestos in drinking-water

**Background document for development of
WHO *Guidelines for drinking-water quality***

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Preface

Access to safe drinking-water is essential to health, a basic human right and a component of effective policy for health protection. A major World Health Organization (WHO) function to support access to safe drinking-water is the responsibility “to propose ... regulations, and to make recommendations with respect to international health matters ...”, including those related to the safety and management of drinking-water.

The first WHO document dealing specifically with public drinking-water quality was published in 1958 as *International standards for drinking-water*. It was revised in 1963 and 1971 under the same title. In 1984–1985, the first edition of the WHO *Guidelines for drinking-water quality* (GDWQ) was published in three volumes: Volume 1, Recommendations; Volume 2, Health criteria and other supporting information; and Volume 3, Surveillance and control of community supplies. Second editions of these volumes were published in 1993, 1996 and 1997, respectively. Addenda to Volumes 1 and 2 of the second edition were published in 1998, addressing selected chemicals. An addendum on microbiological aspects, reviewing selected microorganisms, was published in 2002. The third edition of the GDWQ was published in 2004, the first addendum to the third edition was published in 2006, and the second addendum to the third edition was published in 2008. The fourth edition was published in 2011, and the first addendum to the fourth edition was published in 2017.

The GDWQ are subject to a rolling revision process. Through this process, microbial, chemical and radiological aspects of drinking-water are subject to periodic review, and documentation relating to aspects of protection and control of drinking-water quality is accordingly prepared and updated.

Since the first edition of the GDWQ, WHO has published information on health criteria and other information to support the GDWQ, describing the approaches used in deriving guideline values, and presenting critical reviews and evaluations of the effects on human health of the substances or contaminants of potential health concern in drinking-water. In the first and second editions, these constituted Volume 2 of the GDWQ. Since publication of the third edition, they comprise a series of free-standing monographs, including this one.

For each chemical contaminant or substance considered, a background document evaluating the risks to human health from exposure to that chemical in drinking-water was prepared. The draft health criteria document was submitted to a number of scientific institutions and selected experts for peer review. The draft document was also released to the public domain for comment. Comments were carefully considered and addressed, as appropriate, taking into consideration the processes outlined in [Policies and procedures used in updating the WHO guidelines for drinking-water quality](#) and the WHO [Handbook for guideline development](#). The revised draft was submitted for final evaluation at expert consultations.

During preparation of background documents and at expert consultations, careful consideration was given to information available in previous risk assessments carried out by the International Programme on Chemical Safety, in its Environmental Health Criteria monographs and Concise International Chemical Assessment Documents; the International Agency for Research on Cancer; the Joint Food and Agriculture Organization of the United Nations (FAO)/WHO Meeting on Pesticide Residues; and the Joint FAO/WHO Expert Committee on Food Additives (which evaluates contaminants such as lead, cadmium, nitrate and nitrite, in addition to food additives).

Further up-to-date information on the GDWQ and the process of their development is available on the WHO website and in the current edition of the GDWQ.

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Many individuals from various countries contributed to the development of the GDWQ. The efforts of all who contributed to the preparation of this document are greatly appreciated.

Acronyms and abbreviations

A/C	asbestos–cement
ATSDR	Agency for Toxic Substances and Disease Registry (USA)
bw	body weight
CI	confidence interval
F-yr/mL	total number of fibres in one year per mL of air
GI	gastrointestinal
IARC	International Agency for Research on Cancer
MFL	million fibres per litre
SIR	standardized incidence ratio
USA	United States of America
WHO	World Health Organization

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Executive summary

Asbestos minerals are naturally occurring and widespread in the environment, with the erosion of asbestiform rocks leading to naturally occurring asbestos fibres in water sources used for drinking-water. Human activities may also lead to contamination of surface waters. Asbestos was historically used in a large number of construction materials, including asbestos–cement (A/C) pipes carrying drinking-water. Although these would be replaced at the end of their operational life, many hundreds (and possibly thousands) of kilometres of A/C pipes are likely to remain in use globally as a result of the longevity of asbestos products and the risk management advice to keep products in place, where possible, to reduce health risks associated with removal. A/C pipes in contact with drinking-water are considered the main exposure source of asbestos in drinking-water. The ubiquitous nature of asbestos in the environment means that a background level of human exposure will occur via water, food and air.

The toxicological profile of asbestos fibres depends heavily on the route of exposure; inhalation exposure is associated with the most concern. Asbestos fibres are known human carcinogens by the inhalation route. Although, the data on adverse effects following ingestion are less clear, the overall weight of evidence from available epidemiology and animal studies does not suggest an increased risk of cancer following ingestion of asbestos in drinking-water. Epidemiological studies have evaluated the correlation between asbestos exposure via drinking-water and incidence of cancers of the stomach and gastrointestinal tract. The results are inconclusive, with some studies suggesting a weak positive correlation and others finding no evidence of a correlation. In addition, chronic feeding studies in rats and hamsters have similarly failed to produce any evidence of cancer effects or systemic toxicity. Thus, no causal association between asbestos exposure via drinking-water and cancer development has been reported for any asbestos fibre type.

Based on the above, it is not considered appropriate or necessary to establish a guideline value for asbestos fibres in drinking-water. Furthermore, epidemiological studies have a number of limitations that would preclude their use for deriving a guideline value. However, in view of the uncertainties and limitations of the data, it is appropriate to minimise the concentrations of asbestos fibres in drinking-water as far as practical. Where A/C materials are used, such as in pipes and storage containers, degradation and release of fibres into drinking-water should be minimized by controlling water corrosivity or coating A/C pipes with suitable structural linings. As these materials fail or deteriorate significantly, the A/C materials should be replaced with non-asbestos-containing materials. No new sources of asbestos fibres in drinking-water should be introduced. Where replacement or repair of parts is required, it is essential to prevent

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